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UNITED STATES DEPARTMENT OF AGRICULTURE

BUREAU OF ENTOMOLOGY AND PLANT QUARANTINE

FOREST INSECT INVESTIGATIONS

Project	Date	Author

TITLE

CONTROL RECOMMENDATIONS FOR THE BURNEY, FALL RIVER AND McCLOUD AREAS ON THE LASSEN AND SHASTA NATIONAL FORESTS

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Berkeley 4, California
December 8, 1944

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SUBJECT—

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UNITED STATES DEPARTMENT OF AGRICULTURE
BUREAU OF ENTOMOLOGY AND PLANT QUARANTINE
~~WASHINGTON, D.C.~~
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CONTROL RECOMMENDATIONS FOR THE BURNEY, FALL RIVER AND McCLOUD AREAS ON THE LASSEN AND SHASTA NATIONAL FORESTS

I. THE PRESENT SITUATION.

Timber losses caused by insects in ponderosa pine in the Burney, Fall River and McCloud areas on the Lassen and Shasta National Forests are fast approaching epidemic proportions. Losses in these areas are more critical than for any other area of comparable size in the whole California region. In 1942, except for a few local areas losses were at the lowest point since records were started in 1930. A definite increase was apparent in 1943, particularly in the late overwintering generation on and adjacent to 1942 and 1943 cutting areas in the Burney Falls, Cayton, Dana and McCloud Flat units. Numerous groups of Ips infested poles were observed on recent cut-over areas and those areas closely adjacent. This condition was called to the attention of the Forest Service and local owners in the spring of 1944, but the general consensus was that this was a temporary condition which would subside, so no control work was started. This assumption, however, proved to be erroneous. The 1943 overwintering groups were followed by a moderate increase of losses in the first and second beetle generations of 1944, with a tremendous build up in the third and overwintering generations. Not only have all infestation centers greatly expanded in 1944 (except where control was carried out in the McCloud Flat unit jointly by the Forest Service and the McCloud River Lumber Company), but also there has been a considerable increase in the number and extent of new infestation centers.

II. FACTORS CONTRIBUTING TO THE PRESENT SITUATION.

In the past practically all of our research activities have been pointed to a solution of the western pine beetle problem with very little attention given to the Ips problem. We now find, in the present situation, that losses due to Ips are far more serious than losses due to D.b. The present serious local situation appears to be definitely connected with the type of cutting in common practice in the Burney area since 1941.

This cutting practice during the past four years has been to cut the logs needed to supply the Burney mills for the early spring months from the Burney Flat unit that permits early spring logging activity. These operations have resulted in the creation of a considerable amount of slash for a

temporary period in the form of unmerchantable tops and large limbs where Ips have found an ideal breeding ground This temporary slash is available for only the first generation of Ips; when the next generation of beetles emerge and find no fresh available slash, they then attack the reserve stand, on or closely adjacent to the cutting. The previous belief was that this type of an infestation was of a temporary nature and would not cause a further menace to the reserve. In the case of the Burney Flat, Clark Creek and Soldier Mountain units, this assumption did not materialize, particularly during the 1944 season.

On one of our experimental plots the first generation of Ips was all confined to slash laid down in May with no pole attack; the next generation attacked six poles and the successive generations have increased the group to 113 (Figure 1 and 2). This experimental plot was cut on a sanitation-salvage basis in May 1944 with the removal of only the high risk trees on a Shasta National Forest timber sale. This was one of our permanent sample study plots, established in 1939, where all the trees over 12 inches d.b.h. had been numbered and risk rated, with individual crown characters recorded for each tree. This serious depletion of the reserve stand occurred in low risk trees exclusively with all attacks being initiated by Ips, and in some cases with later fill in of D.b. In this loss of 113 trees, 53 occurred in numbered trees over 12 inches in diameter, with merchantable timber losses estimated at 515 board feet per acre for the 1944 loss.

Another example of heavy loss on cutting areas is in the Lassen Forest Service sale to the Burney Lumber Company in Goose Valley. This cutting was made in early June 1944 on Forest Service "shot gun" holdings in that unit. Seven forties were cut in this unit at that time. One of these forties was selected as a sample of losses and was cruised on November 25 with the results as indicated in Table 1. On these 40 acres, 361 infested ponderosa pines and 30 sugar pines were counted with a total volume of 20,960 board feet of merchantable timber in ponderosa pine and 960 board feet of sugar pine reserve, averaging 525 and 25 board feet per acre respectively. In this particular sample, practically every tree was infested with Ips and either killed outright or so badly injured that there will be no chance for recovery. D.b. had filled in practically none of these trees.

Another serious aspect of this situation is that the insects have not confined themselves to the cutover areas exclusively, but have often moved over the ownership lines and committed acts of trespass. The two above illustrations serve as examples of what is occurring on the 1944 cutting areas. In the case of 1942 and 1943 cutting areas, the Ips has migrated into adjacent uncut areas and is causing tremendous large-group losses. These groups , as large as 50 merchantable trees in a place, are scattered all over the Burney Falls, Hat Creek, Clark Creek and Soldier Mountain units, but are rarely found more than a mile from some cutting area (Figure 3 and 4).

Table 2, 3 and Figure 4 illustrate the 1944 loss picture as compared to 1943 on sample plots in the Burney area. There is considerable sampling error involved in these data and they must be considered only as estimates when applying them to the whole unit. The occurrence of large scattered groups makes sampling particularly difficult. In comparing the 1944 loss for the Burney Falls unit we find that these losses are over four times the loss on comparable samples for the 1943 season.

III. RECOMMENDATIONS FOR CONTROL.

Developments in the Burney area in 1944 serve to illustrate the need for direct control in reducing Ips populations. The principal attack on the insect problem in ponderosa pine in the eastside pine region for the past few years has been indirect control through sanitation-salvage by the removal of trees highly susceptible to attack by the western pine beetle. This method, although effective in controlling the western pine beetles, has no effect on controlling Ips. As a matter of fact, in the Burney areas the timing of these cuttings has actually created ideal conditions for a build up of Ips populations, which by top-killing numbers of trees in the reserve stands create conditions which favor the building up of western pine beetle infestations.

The problem that now confronts pine owners and operators in the Burney area is an aggressive Ips population, stimulated by the slash from cutting operations, with a western pine beetle population building up behind the Ips through attacks in top-killed trees. The ultimate threat to the mature timber in the entire Burney area lies in the trend of this western pine beetle infestation. The amount of top-killed trees now on the area is believed to provide enough susceptible material to build up a western pine beetle epidemic in the next year or two.

The only immediate and practical control action now open to those concerned is a large control program along the following lines:

1. Attack the 1944 overwintering Ips infestation in pole groups with direct control by the cut and burn method, using power equipment wherever this will cheapen the cost of the operation.
2. Treat all trees infested by the western pine beetle either by salvage where trees are accessible to roads or by the cut-peel-burn method, leaving the trees in the woods.
3. Salvage top-killed trees wherever this is feasible to reduce the western pine beetle hazard.
4. Treat all slash that is heavily infested with Ips.

Owners of this timber can consider two courses of action under the present conditions. These are (1) do nothing about it and wait for the present infestation to subside, or (2) adopt a control program along the lines suggested above.

If the first "let nature take its course" policy is adopted, at least one or the other of two quite divergent results can be expected.

1. The infestation may subside in 1945.

There is nothing very tangible on which to base this assumption, except that Ips infestations which have been observed in the past have been rather sporadic in their behavior. It was expected by some that this Burney infestation would subside in 1944, but instead it has increased about 400 percent. The same conditions of slash created by continuing logging operations that favored the 1944 increase will be present in 1945 and for a number of years to come.

2. The infestation will not subside in 1945.

This would mean that very heavy losses will occur in the reserve stand on Forest Service Sale areas and on private cutover, that the western pine beetle may continue to gain momentum, and that ultimately heavy losses will occur in the mature stands throughout the area. If the policy of no control is adopted, it will have to accept the hazard of continuing heavy losses in 1945 and for as long as present conditions continue.

If the second policy of a control program is adopted, the best that can be expected from such action can be summed up as follows:

1. Losses for 1945 in reserve and cutover will be materially reduced. This assumption is supported by the results from the 1944 spring control work on McCloud Flats where an attack was made on a similar Ips-D.b. type of infestation.

2. The western pine beetle can be prevented from becoming epidemic in mature stands. This assumption is based on the expected removal of susceptible trees which have been top-killed by Ips.

3. Much of the infested material which is merchantable can be salvaged by local mills and the control operation can be made partly self-supporting.

In view of these considerations, the recommendations of this report are that the owners undertake control work in the areas which will be discussed in the following page.

IV. PROPOSED CONTROL AREAS.

The attached map of the Burney and Fall River areas shows the areas in need of immediate action during the winter of 1944-45. Those areas of first priority are shown in red and those of second priority in yellow. The red areas represent cutting areas of 1944 or '43 where the problem is most acute and where the population of Ips is very heavy, principally in small unmerchantable poles. The best estimate possible at this time of the number of infested poles is about 1,500 per section with practically every pole carrying Ips brood in some stage at this time. Many of these insects are in the pupal stage and might emerge this winter if climatic conditions are favorable. Intermingled with the small poles are some merchantable trees and it may be possible to utilize some of these for lumber but for the most part this control job will be a straight cut and burn proposition. This first priority area is shown in Table 4.

The areas of second priority are those areas adjacent to recent cuttings where Ips are forming large isolated groups in merchantable trees. It is estimated that the infestation in the yellow areas will run over 75 trees per section and approximately 225 board feet of infested volume per acre. It is suggested that utilization control, similar to that practiced by the McCloud River Lumber Company for many years, be used in these areas. From the experience of the joint McCloud-Forest Service control crew in the McCloud Flat area in the spring of 1944, it was found that the merchantable trees could be logged to the mill cheaper than they could be treated in the old conventional cut-peel-burn method. In addition, it makes it possible to utilize several million board feet of merchantable timber that would otherwise be a complete loss.

V. COST OF CONTROL

Table 4 furnishes an estimate of the cost of direct control in unmerchantable infested poles and infested tops of trees that are salvaged. It is difficult to arrive at accurate cost estimates on these proposed control areas due to the lack of an accurate yardstick on which to base such estimates. These control costs are based on the assumption that all accessible infested merchantable volume will be logged to the mill and that such a logging operation will at least not cost more than the value of the product salvaged. This means also that in such an operation there will probably be no margin for stumpage. The majority of the owners in the area have already indicated a willingness to help defray control costs by donating all infested stumpage on their lands to any operator who will salvage it.

In a salvage operation of this kind, the only portion of the tree needing direct treatment is the unmerchantable top. This should reduce the cost of control about two-thirds. If it develops that salvaging the infested material is not feasible and it becomes necessary to carry on direct control for each merchantable tree, the control costs on such trees would be about three times the estimate in Table 4. If the Forest Service, for example, desires to log out and sell the salvagable material on their land instead of giving free use of infested stumpage, it will be necessary to request additional funds to take care of such an operation.

On the basis of estimates in Table 4, the Forest Service will need about $15,000 for control on the Shasta and about $5,000 for control on the Lassen, while the private owners in this area will need about $19,000 for control on private land. Broken down by units - for the Burney unit the Forest Service would need about $11,000 and private needs would be about $10,000; for the Hat Creek unit the Forest Service would need about $4,000 and private $4,000; in the Clark Creek and Soldier Mtn. units the Forest Service would need $3,000 and private $4,500; and for the McCloud Flat unit the Forest Service would need $2,000 and private $600.

In arriving at an estimate of total cost of spotting, treating and overhead for the different classes of material, the average cost of treating unmerchantable poles has been set at about 80 cents and of unmerchantable tops

and trees at about $3.50 each. It may be noted that the average cost per tree per unit varies considerably. This variation is principally due to topography and concentrations of the infested material. The ideal solution of the problem would be 100 percent salvage of all infested merchantable volume but it is realized that such a program is not completely practical because of the inaccessibility of some of the trees. Such trees will need to be treated in place and these estimates are based on the assumption that there will be a small percentage of such trees in each unit which need direct control.

VI. COOPERATION OF ALL OWNERS.

The need for the control of Ips in the Burney area is a community problem and to be effective should be carried out on all types of ownership where the problem is acute. The McCloud River Lumber Company has indicated its willingness to cooperate with the Forest Service in the Clark Creek, Soldier Mountain and McCloud Flat units. The pending sale of the Red River Lumber Company's holdings in the Burney area has prevented specific committments by the major private owners in the Burney Falls and Hat Creek units. A local committee is working on that problem and the present indications are that cooperation of the private owners in this area will be assurred. The Forest Service is asking for funds to cover their control needs on the Shasta and Lassen National Forests and the State Division of Parks is prepared to carry on control on the Burney Falls State Park. An estimate of the cost of control on various types of ownership is furnished in Table 4.

Ralph C. Hall
Entomologist

Table 1. Distribution of Losses on Two 1944 Cutting Areas in the Burney Area - All loss occurred in Low Risk.

Trees	20 Acres - Sample Warners Bridge Sanitation-Salvage Plot	40 Acres - Sample Goose Valley F.S. "Shotgun" Cutting	
DBH	Ponderosa Pine	Ponderosa Pine	Sugar Pine
4	10	↑	↑
6	8		
8	24	289	23
10	17	↓	↓
12	34	34	3
14	7	10	1
16	5	4	2
18	5	7	1
20	2	5	
22		2	
24		3	
26		4	
28			
30		1	
32		1	
34		1	
Total Number	113	361	30
Total Volume	8760 Bd. ft.	20,960 Bd.ft.	960 Bd.ft.
Volume per acre 1944 loss cruised	438	525	25
Volume per acre total 1944 loss estimate	515	615	30

Table 2. Comparison of Timber Loss in the Burney Falls Unit for the Season of 1943 and 1944 on Permanent Sample Plots.

Sample	Size Acres	1943 Loss Volume per Acre Board Feet	1944 Loss Volume per Acre Board Feet	1944 Loss Number trees per Section. Above 12" DBH	Below 12" DBH
R.S. 11	80	43	292	200	3000 *
R.S. 12	320	51	173	90	
R.S. 13	160	59	300	160	
R.S. 17	320	92	330	160	
Plot 1	20	80	976	600	
2	20	102	515	1728	2370 **
4	20	120	570	300	
6	20	154	636	250	
7	20	0	167	96	
9	20	52	107	64	
11	20	87	216	160	
12	20	115	90	96	
13	20	0	309	128	___
Average		68	287	179	

* Highway sanitation-salvage strip cut in April 1944.
** Warners Bridge plot sanitation-salvage experimental cutting May 1944

Table 3. Sample of 1944 Loss on Forest Service "Shotgun" cutting in Goose Valley, Hatchet Mt. Unit. 40 acres. Cutting made June 1944.

Volume per acre, 1944 loss	647 Bd. ft. per acre
Number trees over 12" per section	1150
Number trees under 12" per section	6000

Table 4. Control Needed

	Priority	Acres	Number infested trees and volume: Unmerchantable	Salvage No. trees	Bd. ft. Volume		Estimated control cost: Unmerchantable	Salvage	Total
BURNEY UNIT									
FOREST SERVICE									
Cutover									
Shasta	I	3,380	6,500	1,000	250,000		$4160.	$3000.	$ 7160.
Lassen	I	640	2,700	300	90,000		1088.	900	1988.
		4,020	9,200	1,300	340,000	81	$5248.	$3900.	$ 9148.
Virgin									
Shasta	II	5,620	225	675	590,000		225.	2025	2250.
Total F.S.		9,640	9,425	1,975	930,000	99	$5473.	$5925.	$11398.
PRIVATE									
Cutover	I	1,000	3,000	200	60,000	60	1920.	600.	2520.
Virgin	II	18,000	600	2,000	2,600,000	145	600.	6500.	7100.
Total Private		19,000	3,600	2,200	2,660,000		$2520.	$7100.	$9620.
Total		28,640				3,590			
HAT CREEK UNIT									
FOREST SERVICE									
Virgin									
Lassen	II	6,000	500	700	615,000	102	$1000.	$2800.	$3800.
PRIVATE									
Cutover	I	700	100	80	25,000		200.	320.	520.
Virgin	II	6,500	300	750	700,000		600.	3000.	3600.
Total		7,200	400	830	725,000	100	$800.	$3320.	$4120.
CLARK CREEK - SOLDIER MTN. UNITS									
FOREST SERVICE									
Shasta	II	5,280	300	620	700,000		$ 600.	$2480.	$3080.
PRIVATE	II	4,000	1,000	600	650,000	145	2000.	2400.	4400.
McCLOUD FLATS UNIT									
FOREST SERVICE									
Shasta	II	5,000	600	200	250,000		$1400.	$1100.	$2500.
PRIVATE	II	2,000	100	100	120,000		200.	400.	600.
ALL UNITS									
FOREST SERVICE									
Shasta		19,280	7,625	2,495	1,790,000		$6,185.	$ 8,305.	$14,990.
Lassen		6,640	3,200	1,000	705,000		2,088.	3,700.	5,788.
Total		25,920	10,825	3,495	2,495,000		8,273.	12,005.	$20,778.
PRIVATE		32,200	5,100	3,730	4,155,000		5,520.	13,220.	$18,740.
TOTAL F.S. AND PRIVATE		58,120	15,925	7,225	6,650,000		$13,793.	$25,225.	$39,518.

Figure 1. Losses on cutover.

Complete killing of poles, in a reserve stand, by *Ips*, that was cut on a sanitation-salvage basis in May 1944 on the Warners Bridge experimental plot on a Shasta Timber Sale Area. The initial attack in this group in August was 6 trees. This 6-tree group has expanded to 113 in November 1944. This figure shows only a part of the whole group. All trees attacked in this group were those considered as low risk from the standpoint of *D. b.* This is an example where sanitation-salvage alone was not enough.

Figure 2. Losses on Cutover.

Another illustration of the loss in reserve trees due to Ips on a Forest Service Timber Sale in the Warners Bridge Area. About 65 percent of volume was removed in the cutting in May 1944. This included removal of all high risk trees. Note the thrifty character of infested trees. Note also the type of slash in the form of large unmerchantable tops that served as an ideal breeding ground for Ips. There was no attack in the reserve stand until after the first generation had completed their development in slash. Practically every infested tree in the group still contains Ips brood. Infested trees are denoted by red arrows.

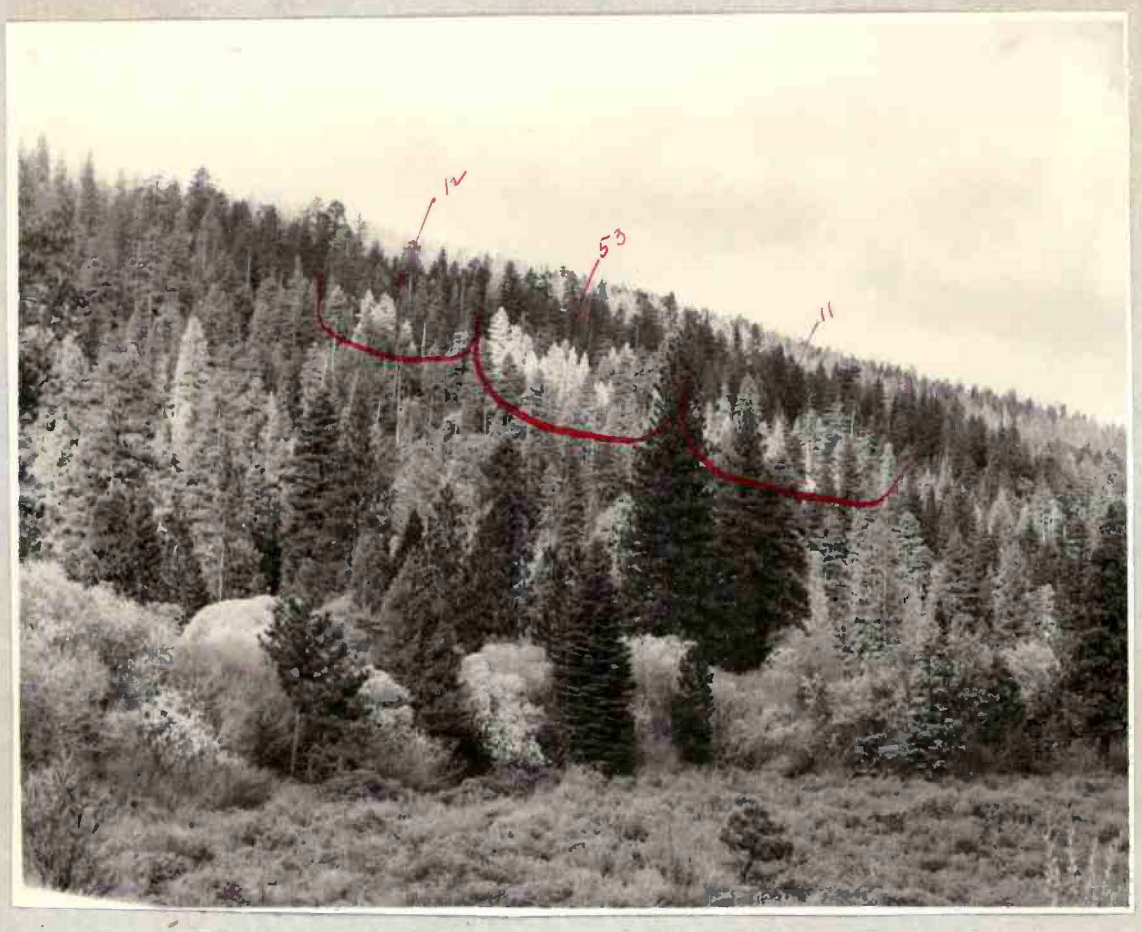


Figure 3. Losses in Virgin Stands.

An example of the type of large group very thrifty trees killed by Ips in a virgin stand adjacent to a cutover area. Cutting made two years ago. The red numbers represent the number of trees in each of these groups. Practically all of these trees are merchantable size.

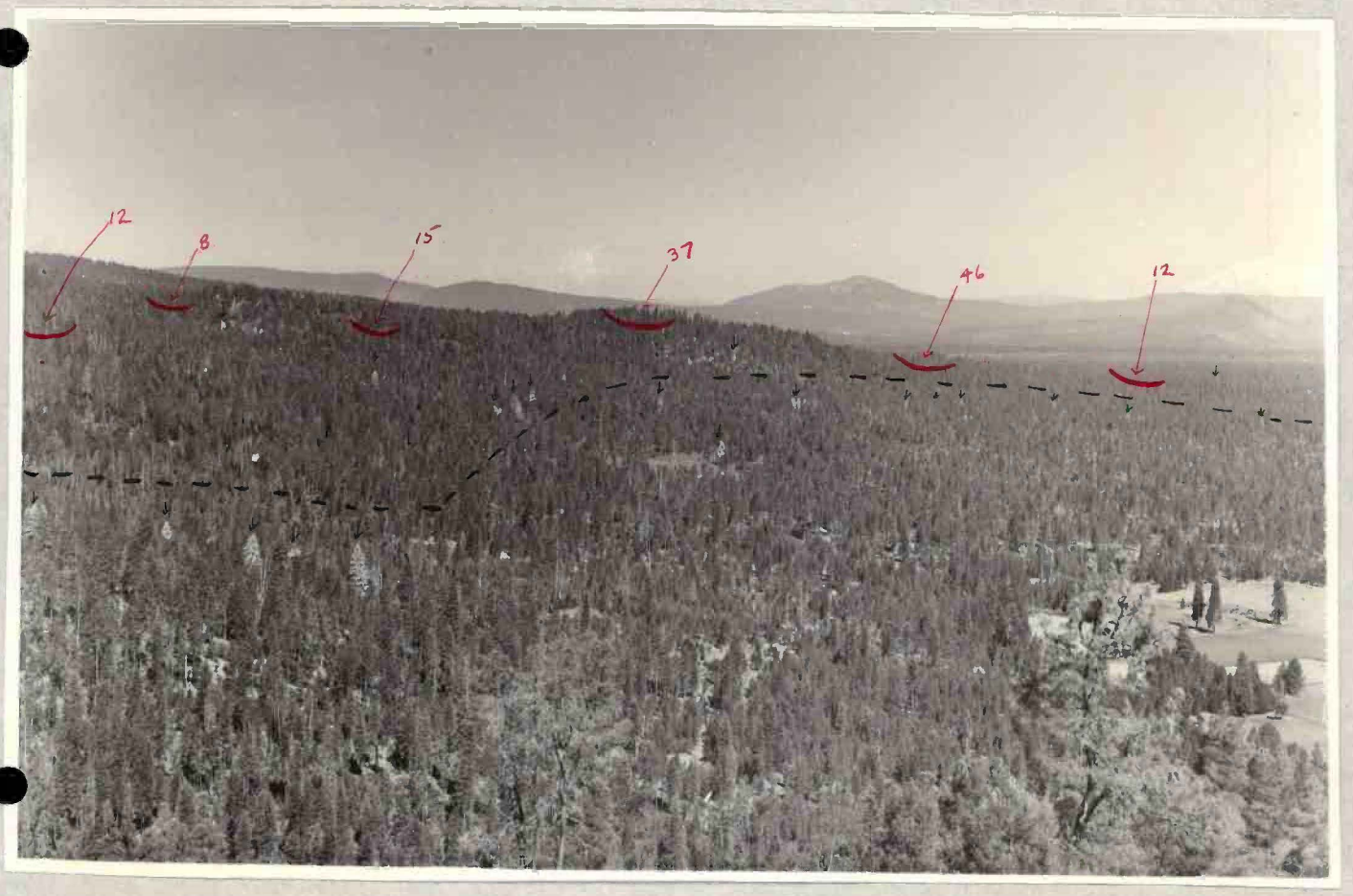


Figure 4. Losses on Cutover and adjacent Virgin Areas.

A view of the Hat Creek unit west of the Startt and Brown ranches where there has been a tremendous increase in loss for 1944. The broken line marks the approximate boundary of cutting in the spring of 1942. The portion above the line is uncut. Black arrows mark the position of 1943 bug trees. The red figures mark the position of new 1944 overwintering groups; the numbers indicate the number of trees in each group. Picture taken in June 1944. The 1942 loss was practically all confined to the cutting area but practically all of the 1944 loss is in the virgin stand.

Figure 5. Losses on Cutover.

Heavy losses of thrifty merchantable reserve caused by Ips in a sanitation-salvage highway strip along highway 299. This cutting, made in April 1944, removed only the high risk trees on the basis of about 18 percent of the volume of the original stand. Of the 7 infested trees showing in the picture, only 1 has been filled in by D.b. If no control work is done in this area, these green bases will furnish optimum breeding places for a breed-up of D.b.

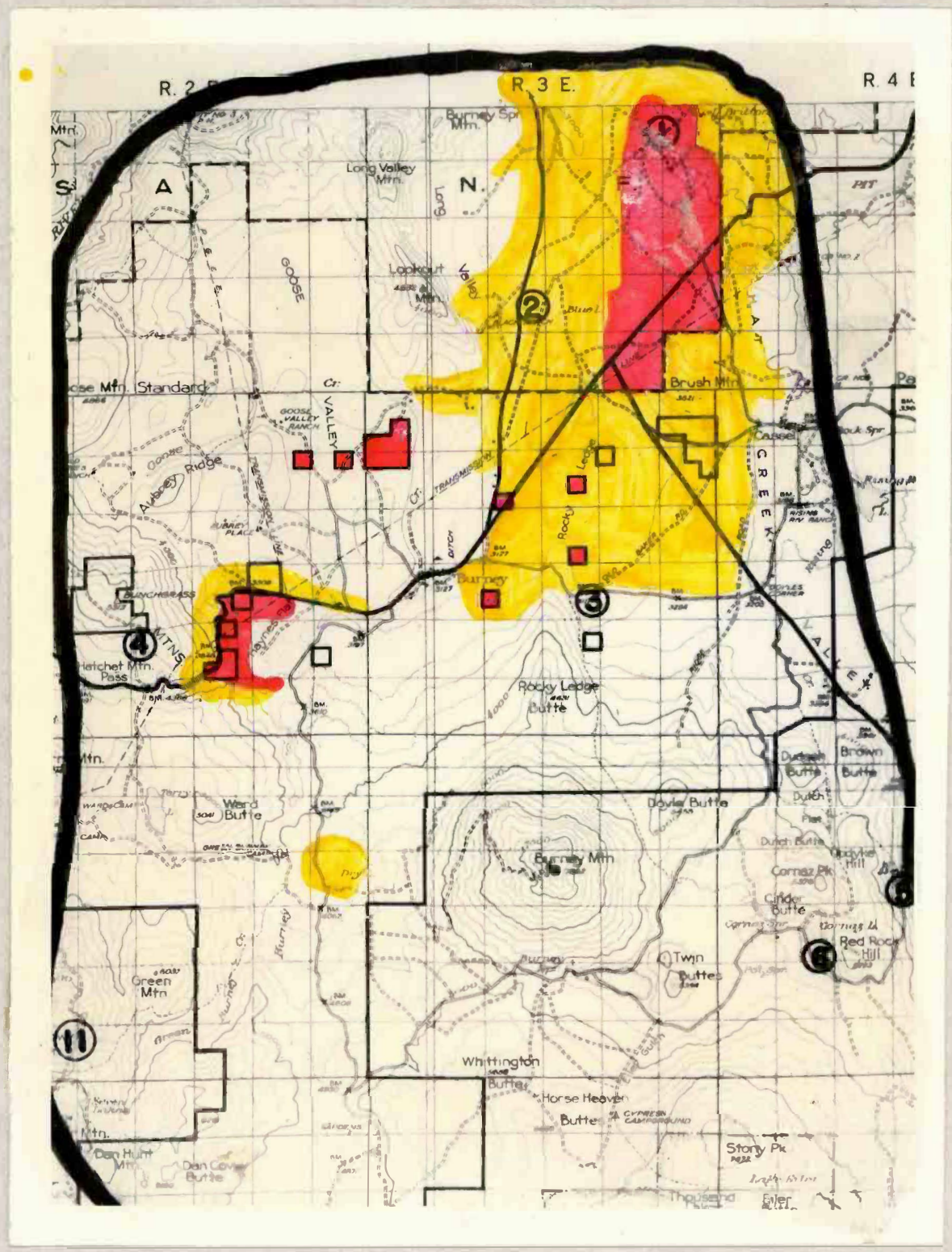


Figure 6. Burney Infestation Unit.

Red indicates areas of first priority, Area I; yellow of second priority, Area II.

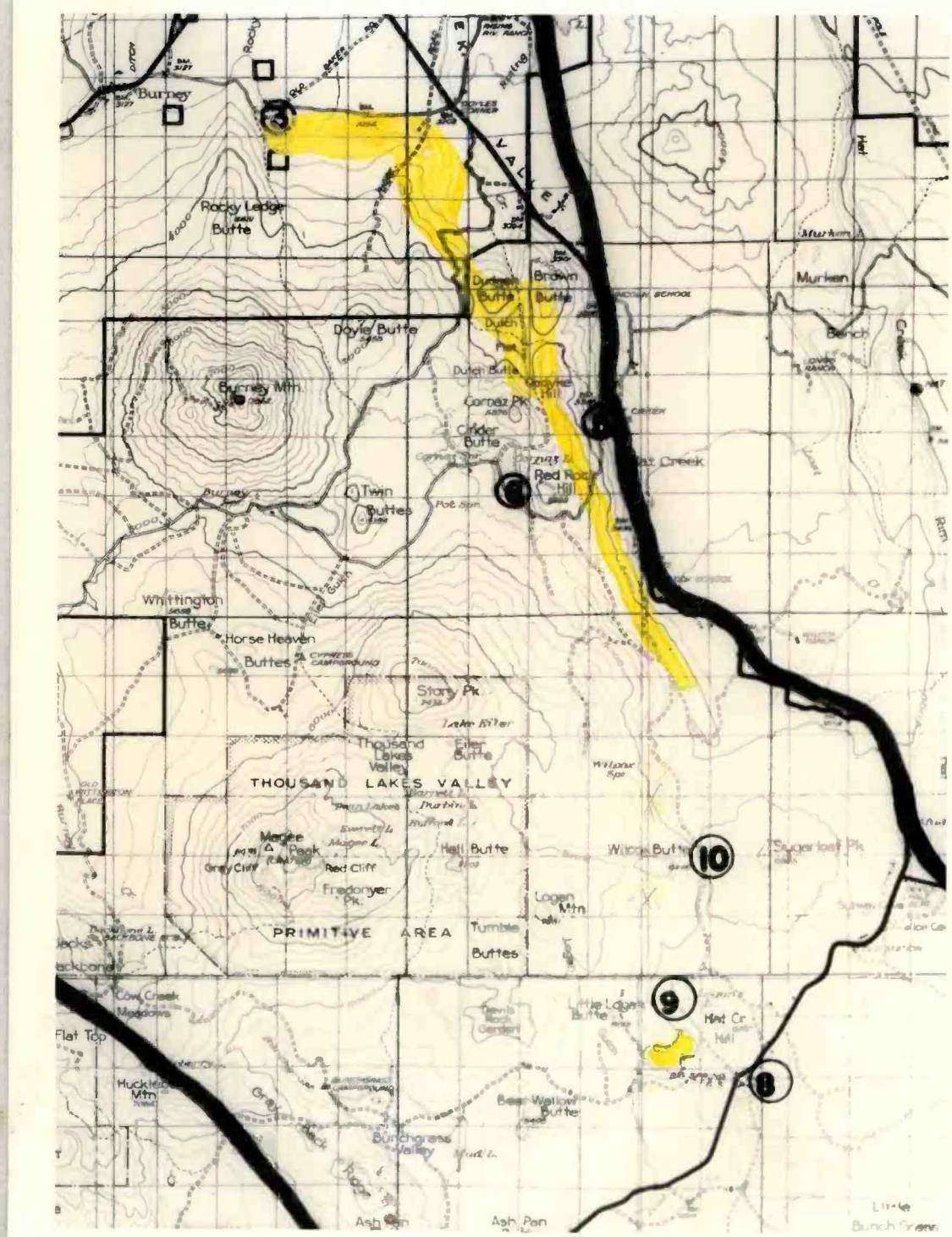


Figure 7. Hat Creek Infestation Unit.

Yellow areas those of second priority in need of control, Area III.

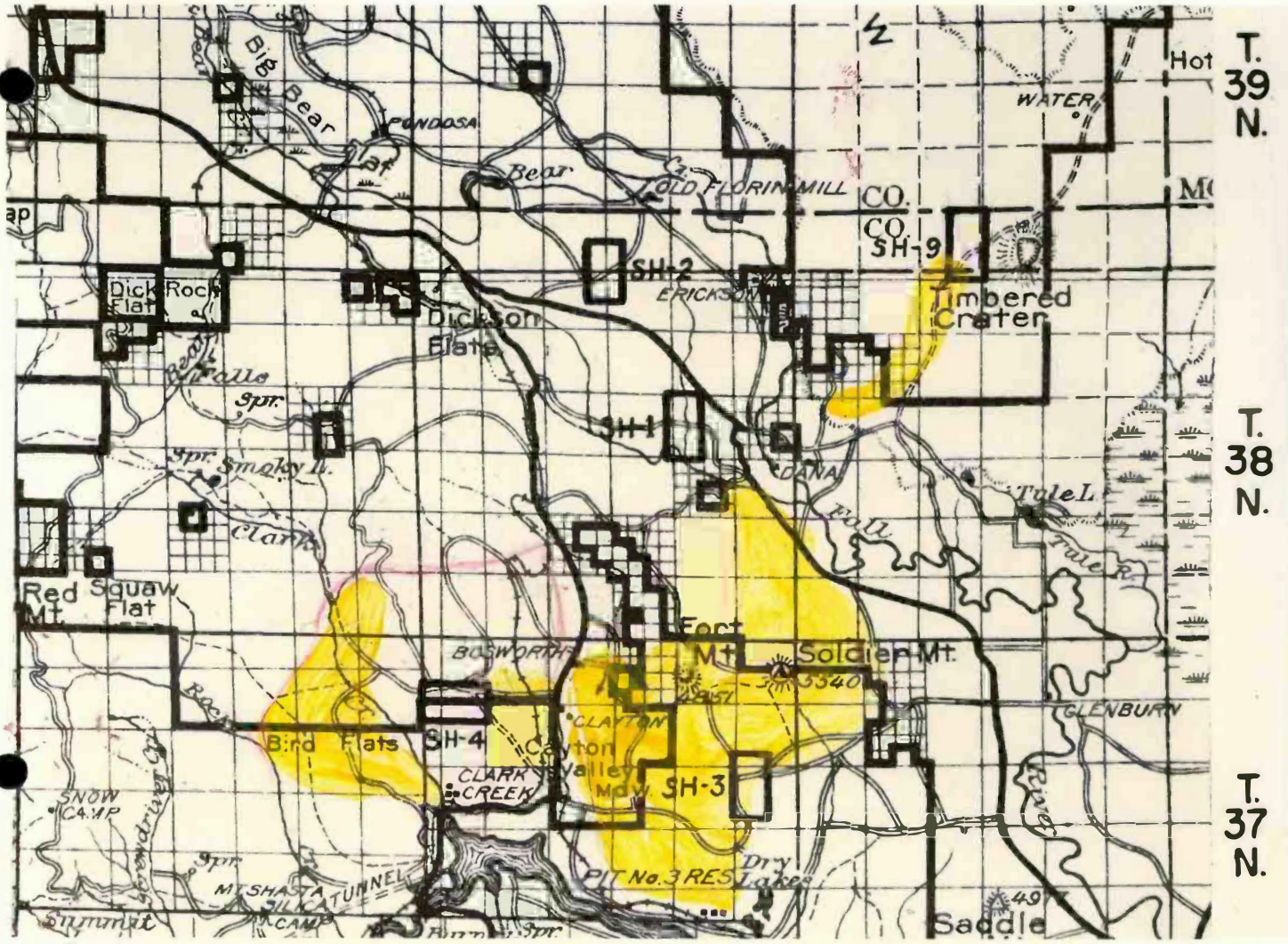


Figure 8. Clark Creek-Soldier Mtn. Infestation Unit.

Yellow areas in need of control, Area IV.

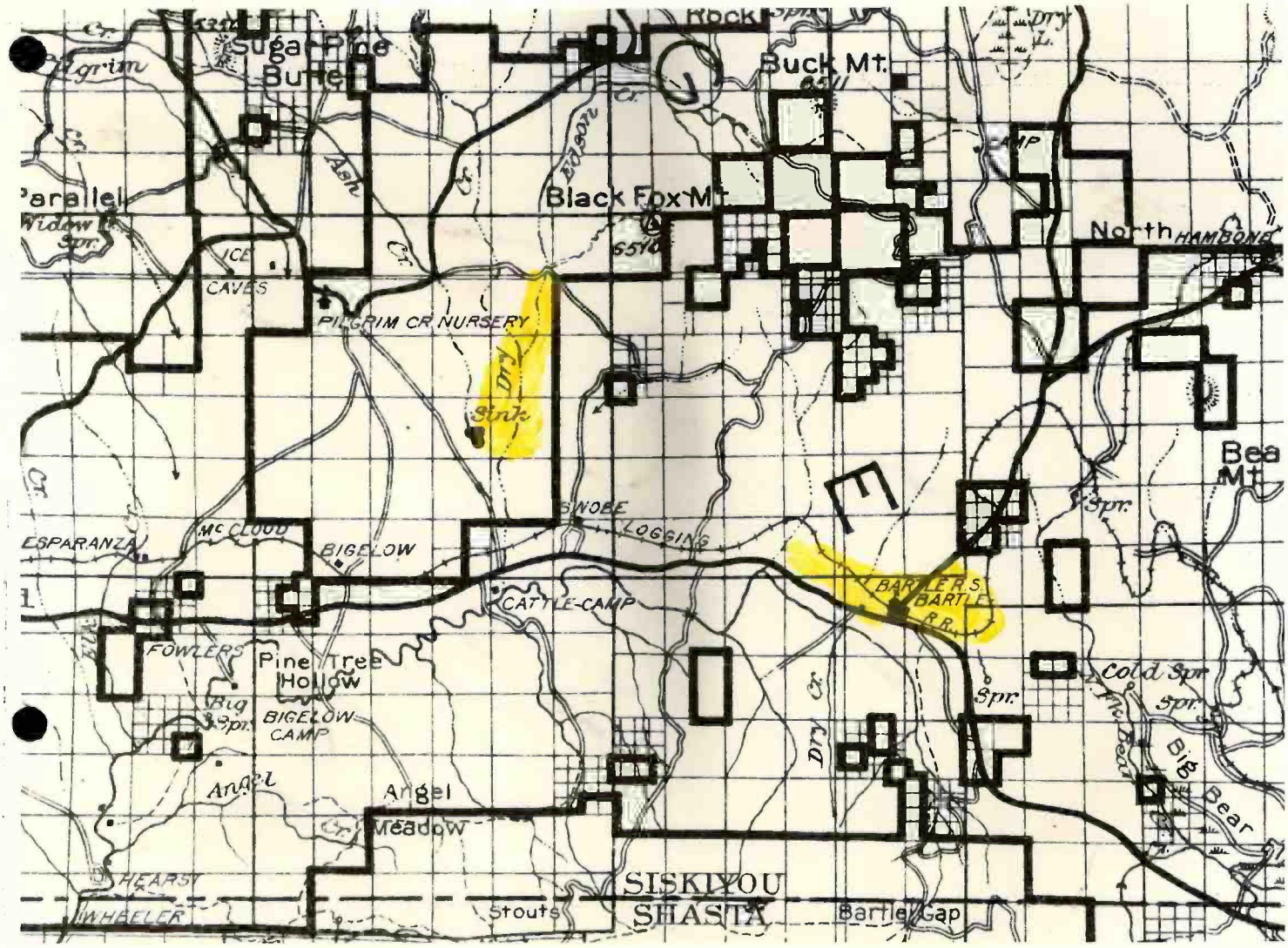
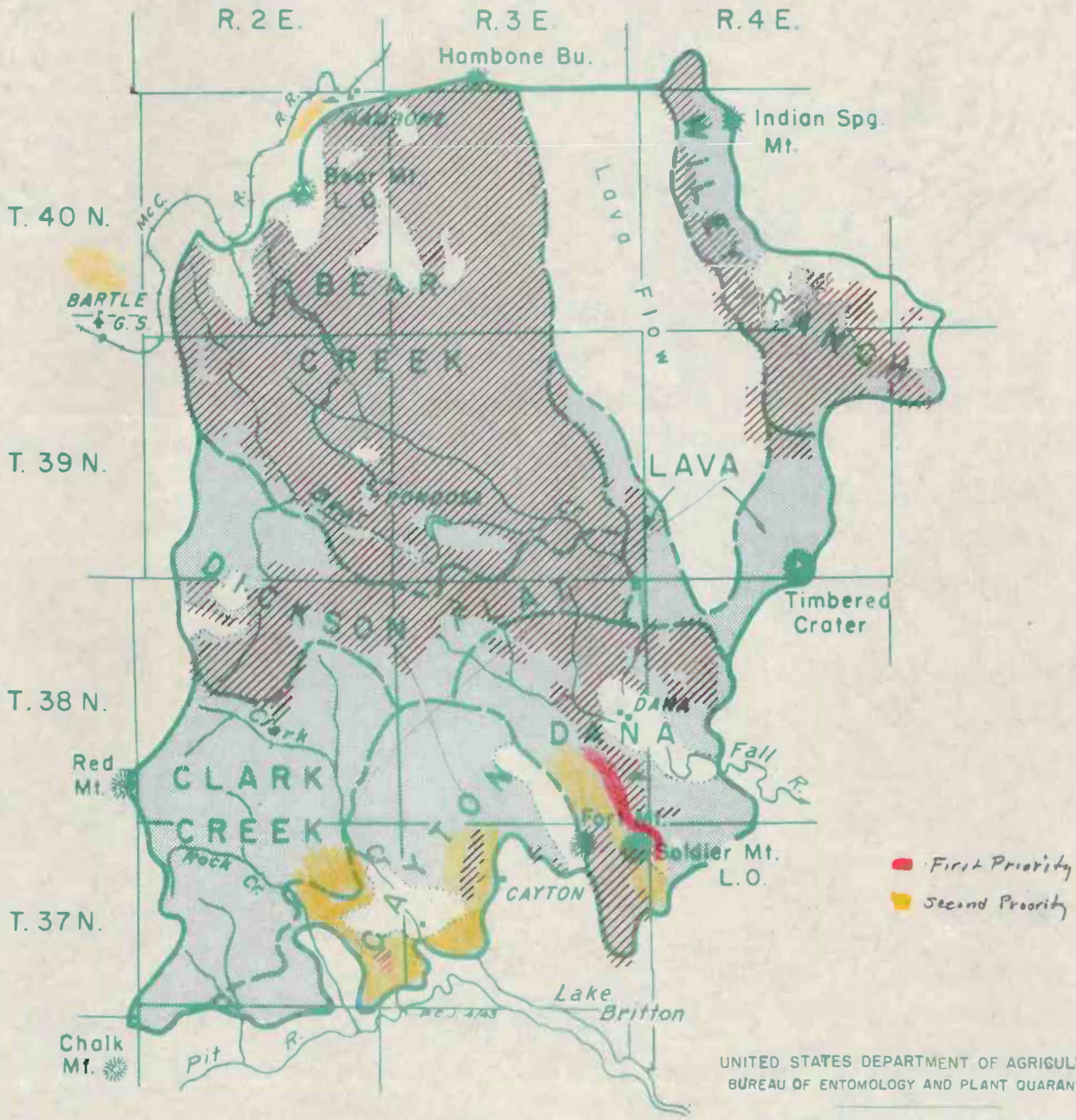


Figure 9. McCloud Flats Infestation Unit.

Yellow area in need of control, Area V.

UNITED STATES DEPARTMENT OF AGRICULTURE
BUREAU OF ENTOMOLOGY AND PLANT QUARANTINE
FOREST INSECT HAZARD INVENTORY
HAZARD CLASSIFICATION
BURNEY AREA, SHASTA COUNTY, CALIFORNIA
LEGEND
HAZARD II – LOW
HAZARD III – MODERATE
HAZARD IV – HIGH
HAZARD V – VERY HIGH
First Priority
Second "
Lake Britton
Pit R.
Burney-Spg Mt.
Lookout Mt.
Burney Cr.
Hat Cr.
Cedar Cr.
BURNEY
Burney Mt.
Snow Mt.
Clover Cr. Mt.
Tamarack Pk.
PRIMOITIVE AREA
Magee Pk.
Logan Mt.
Sugarloaf Pk.
Hilton Pk.
BUNCHGRASS R.S.
Big Bend R.S.
Big Bend Ranger Station
W. Prospect Pk.
Badger Mt.
Table Mt.
NAT'L. PARK
BOUNDARY LINE
T. 36 N.
T. 35 N.
T. 34 N.
T. 33 N.
T. 32 N.
SCALE
0 6
MILES
BOUNDARY OF ENTOMOLOGICAL UNITS
R. 2 E.
R. 3 E.
R. 4 E.
R. 5 E.



UNITED STATES DEPARTMENT OF AGRICULTURE
BUREAU OF ENTOMOLOGY AND PLANT QUARANTINE

FOREST INSECT SURVEY

FALL RIVER AREA
SHASTA NATIONAL FOREST, CALIFORNIA

SEASON OF

SCALE MILES
0 2 4 6

LEGEND

- Pine Timber Type
- Cutover Land, as of
- Boundary Lines
  - Reporting Areas
  - Entomological Units
- Ground Samples
  - Plot
  - Roadside Strips
  - Line Strips
  - Line Plots
  - Road Counts

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